

DISCUSSION

The structures on this map represent interpretations made from approximately 16,000 km of high-frequency single-channel seismic data. The Petty Ray Geophysical Corporation collected 9,300 km of seismic data in 1976 under exclusive contract to the U.S. Geological Survey, Conservation Division. Seismic sources consisted of 1000-tonne sparker and a 3.5-kHz transducer; the ship was navigated using a Miniranger (trademark of Motorola, Inc.), Raydist, and Loran C. The Geological Survey ship R/V Lee collected 3,700 km of 40-in airgun, 90-kilojoule sparker, unboom, and 3.5-kHz data and the Geological Survey ship R/V Sea Sounder collected 3,000 km of 30- to 60-kilojoule sparker, unboom, and 3.5-kHz data. The Geological Survey ships were navigated using Sonar-doppler, Loran C, and Satnav aboard the R/V Lee, and Miniranger, Loran C, and Satnav aboard the R/V Sea Sounder.

Results are indicated in the seismic records by discontinuity in reflectors, sudden divergences in dip not related to stratigraphy, and diffraction patterns. The direction of throw is indicated by vertical displacement, drag folds, and scarps on the sea floor. A few faults nearshore were interpreted solely on the basis of linear scarps in the bathymetry. Several faults on Albatross Bank merge into folds along strike. The contacts between consolidated rock and overlying Pleistocene and Holocene unconsolidated sediment that are exposed on the seafloor were delineated using the seismic records and sediment samples (Hampton and Boma, 1978).

Three areas of recent and rapid tectonism are indicated in the seismic records, one extends northeast along the coast of Kodiak Island and the other two along Albatross and Portlock Banks. The deformed zone along the southeastern coast of Kodiak Island consists of many landward and seaward-dipping, high-angle, en echelon faults that strike northeast. The landward side of this fault zone is exposed along the southeast shore of Kodiak Island. It corresponds to a tectonic zone of regional extent (600 km) proposed by von Huene, Shor, and Malloy (1972) along which local surface displacement occurred during the 1964 earthquake. In other areas of major tectonic deformation along Albatross and Portlock Banks, anticlines commonly bounded by steep faults have formed the banks along which Pleistocene and older sedimentary rocks crop out (McClellan and others, 1980). Albatross Bank was also uplifted during the 1964 earthquake (von Huene and others, 1972). The axes of the Albatross Bank structures trend northeast parallel to regional structures, whereas those of the Portlock Bank are aligned to the northwest, transverse to the regional trend. The data along Portlock Bank are insufficient to establish 1964 tectonism. Portlock Bank is part of an aligned series of features transverse to the trend of this shelf that may mark a fundamental tectonic boundary (Fisher and others, 1980).

The shelf break in part of the area corresponds to tectonic features at or near the surface such as at Albatross Bank the simple anticlines or series of folds and faults. In other places, such as north of Portlock Bank, the tectonic features at the shelf break is deep and is visible only in common depth point data (Fisher and von Huene, 1980). The course of Stevenson Trough appears to be controlled by uplift of Portlock Bank. Glaciers sculpted Stevenson Trough and also the other troughs to the south that are linked to the fjords on Kodiak Island.

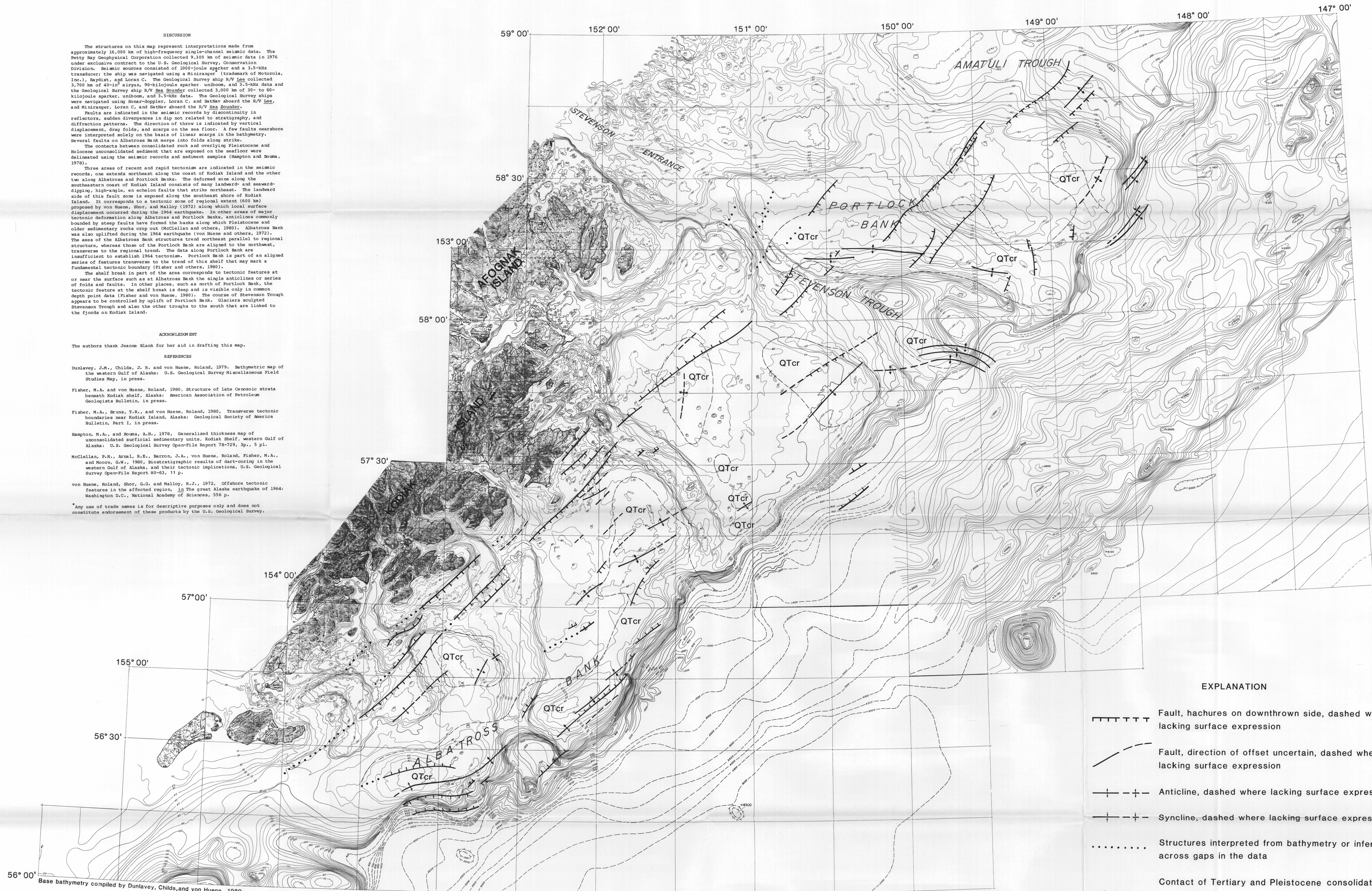
ACKNOWLEDGMENT

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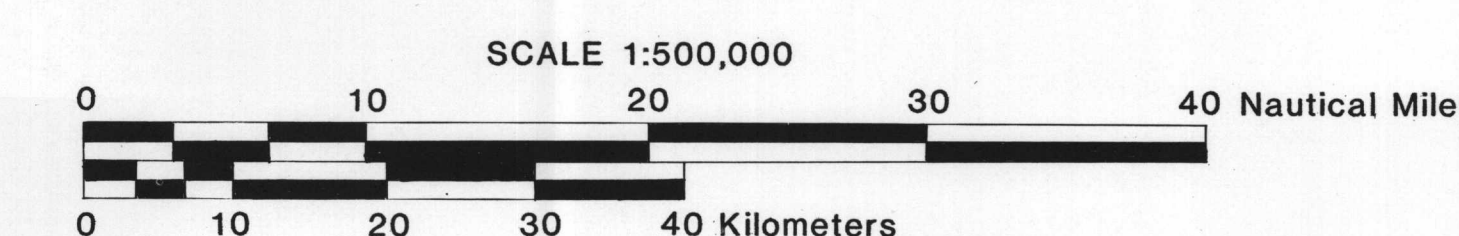
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*Any use of trade names is for descriptive purposes only and does not constitute endorsement of these products by the U.S. Geological Survey.



EXPLANATION

- Fault, hachures on downthrown side, dashed where lacking surface expression
- Fault, direction of offset uncertain, dashed where lacking surface expression
- +---+--- Anticline, dashed where lacking surface expression
- +---+--- Syncline, dashed where lacking surface expression
- Structures interpreted from bathymetry or inferred across gaps in the data
- Contact of Tertiary and Pleistocene consolidated rock with overlying Pleistocene and Holocene unconsolidated sediment
- QTcr Tertiary and Pleistocene consolidated rock



BATHYMETRIC CONTOURS IN METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
Albers Conic Equal-Area Projection
Based on parallels 55°N and 65°N

Interior Geological Survey, Reston, Va.-1980

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MAP SHOWING NEAR-SURFACE GEOLOGIC STRUCTURES OF KODIAK SHELF, ALASKA

by

Roland von Huene, Monty A. Hampton, Michael A. Fisher, David J. Varchol, and Guy R. Cochrane

1980

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